

FOCUS

Nuclear Power Plant: A Prescription for Disaster?

by Ahmad Fazlul Kabir

Most citizens of Bangladesh — children, women and men — live within a 200-mile radius of the proposed Rooppur nuclear power plant. The disastrous effects of such proximal living to a nuclear plant are amply demonstrated in the case of those people living near Chernobyl.

In a recent report (October 17) in *The Daily Star* it is reported that the Government of Bangladesh has decided to implement the Rooppur Nuclear Power Plant Project. The decision was reportedly taken at a meeting of the Rooppur Nuclear Power Project Implementation Committee with the Prime Minister in the chair and the Finance Minister, Energy Minister, Education Minister, Planning Minister and the Atomic Energy Commission Chairman in attendance. It was observed in the meeting that the "environment-friendly" nuclear power project would meet the country's electricity demands, particularly that of the northern region at a lower cost. The Prime Minister directed the committee to speedily implement the project.

In a report in the same daily last year, the Bangladesh Atomic Energy Commission (BAEC) engineers and scientists had pointed out that nuclear technology was considered one of the "safest" power generation systems. BAEC engineers had also indicated that the annual fuel cost of a nuclear power plant was much lower than that of a conventional gas-burned plant. Therefore, according to the proposed nuclear power plant would be part of an optimum mix of electricity-generating plants for Bangladesh.

The concept of the Rooppur project was developed in 1961 and was approved for 70 Megawatt (MW) of electricity generation. The plant site is in Faba district, about 180 kilometers from Dhaka. The current plan is to have a much larger plant of 400 to 600 MW capacity, which is estimated to

cost about \$1 billion. To the unsuspecting general public, only the attractive cost-efficiency, safety and environment-friendly aspects of the nuclear power plant are presented, whereas, underneath lies a complex web of issues which are fraught with potential danger for every citizen of Bangladesh. Let us first examine the cost-effectiveness and safety issues.

Cost-effectiveness

A BAEC scientist was quoted in last year's DS report as saying that "although the initial cost of a nuclear plant is double that of a conventional gas-burned plant, the fuel cost is much lower than that of a coal or oil-burned plant". He further asserted that a typical 300 MW plant would cost about \$600 million. However, data from constructed nuclear plants show that tremendous cost overruns may occur in a nuclear plant owing to unforeseen problems involving safety concerns, faulty construction, etc. The Diablo Canyon Nuclear Power Plant in the USA comes to mind as an example of such cost overruns. This two-reactor plant, designed to generate 1100 MW per reactor, was planned in the early 70s and was estimated to cost around \$500 million. About 90% of the construction was completed in 1976 within budget, when a new earthquake fault was discovered near the plant. Seismologists estimated that this fault was capable of producing a much larger earthquake than the one the plant was designed to withstand. The plant completion was delayed for five years and the cost tripled to \$1.5 billion. In 1981,

the plant was ready to start operations, when the final inspection uncovered numerous errors in design and construction process, improper quality control, inadequate documentation, etc. Another five years were required to identify and correct all these errors. The final cost ballooned to about \$8 billion before the plant started producing electricity 10 years behind schedule. The level of anxiety, this induced in the people unfortunate enough to be living close to the plant, could well be imagined.

Another nuclear plant in Texas, originally estimated to cost about \$1 billion to construct, ended up costing about \$9 billion because of flaws in construction, in welding, improper documentation and inadequate quality control. Shoreham plant in New York, built at a cost of over \$6 billion, was not given permission to begin operations by the New York State governor because of the safety concerns of New York residents. The tax-payers of NY decided to absorb the cost of this large investment rather than have a nuclear plant in their backyard. As a matter of fact, the USA having the largest number of operating commercial nuclear reactors (110) in the world, has no new reactor ordered since the early '80s because of large cost overruns and

public safety concerns. Several electric companies, which invested in construction of nuclear power plants, went bankrupt or are on the verge of bankruptcy. A nuclear power plant project was abandoned in the Philippines after about \$1.5 billion had been spent owing to safety concerns.

Safety Issues

The first fact to note is that operating a nuclear power plant is quite different from the operation of any other kind of power-generating plant, and for that matter, any other kind of industrial facility. This is because of the devastating consequences the population may face if an accident occurs during the operation of a plant. Before elaborating this point, it is necessary to describe, in brief, some special aspects of a nuclear power plant.

A nuclear power plant uses turbines to generate electricity. These turbines are driven by steam or heated gas. In this respect, nuclear power plants are very similar to most of the other power plants. Where it differs from them is how the steam or heated gas is produced to turn the turbines. Typically, in a nuclear power plant, water or gas is heated by the heat energy produced by the fission reaction of radioactive uranium inside a container known as a

reactor. A fission reaction is similar in kind to that taking place in an atomic bomb except that the rate of reaction is carefully controlled to avoid any explosive reaction. Since the material inside the reactor vessel is highly radioactive, it is absolutely necessary to contain it within a sealed system so that minimum radioactivity escapes outside. This is done by using very thick steel plates (10 to 12 inches) to construct the reactor vessel. This vessel acts as the primary containment for the radioactive material. Then, a thick concrete outer building (typically with 2 ft. to 4 ft. thick walls) is built to house the reactor. This building is also sealed from the outside and provides a secondary containment in case radioactive material escapes from the primary containment. There are miles and miles of pipes, many of which are used in back-up safety systems of the plant. Many of these may also carry radioactive fluids. There are hundreds of valves, pumps, compressors, electric motors etc., in the plant.

Once a nuclear power plant is activated, several areas are sealed off, and human access to these areas is limited because of high levels of radioactivity. Remote controlled devices and cranes are used to transport radioactive material to these areas. Any malfunctioning of electro-mechanical systems, operating these remote controlled devices, can lead to very complex problems. Furthermore, the extensive network of pipes, may spring leaks, valves and pumps may malfunction, electric cables in non-accessible highly radioactive areas may cause short circuits, battery packs, electric motors, and diesel generators may break down. Technically simple devices, such as pressure gauges and other indicator dials may not show proper reading due to hydraulic malfunctioning as has been known to happen. Mis-reading of data by plant operators may lead to wrong remedial measures causing possible disasters.

Even though one may point out that BAEC scientists and engineers have been responsible for the planning, design, construction, installation, maintenance and operation of the 3 MW research reactor at Savar, it should be emphasised that a 400 to 600 MW commercial power plant has technical and safety aspects which are not generally encountered in a small research reactor. It may be accurate to surmise that the experience of the BAEC personnel, though valuable, would not be adequate enough to supervise the construction and installation of the Rooppur plant. In fact *The Daily Star* report quoted the BAEC chairman as saying that the International Atomic Energy Commission was willing to provide consultants to ensure safety in the installation and operation of the

plant. It seems that BAEC will largely depend on foreign consultants to ensure safety of the plant as well as design and supply of plant parts and equipment. Such dependence on foreign experts has not always proven beneficial to Third World countries.

A major problem, in operating a nuclear plant, is the disposal and storage of the radioactive waste material produced by the plant. The uranium fuel rods inside an operating reactor vessel become extremely radioactive due to fission reaction. These fuel rods need to be replaced by new fuel rods after specified periods of time. The replaced fuel rods, known as spent fuel rods, are still extremely radioactive and need to be stored in large enclosed pools of water to prevent hazardous radiation from spreading around. The spent fuel rods remain radioactive for a long period of time and storing them safely, without causing leakage of the radiation to the environment is a continuing challenge to engineers and scientists of developed nations. The US has still to find a permanent storage space for all the radioactive material produced by its nuclear power plants. The establishment of a permanent underground storage vault has been a difficult political issue as no community is willing to house such a facility nearby because of long-term safety concerns. These concerns include deterioration of radioactive waste containers due to radioactive and thermal effects and the consequential leakage and contamination of groundwater.

We do not have to rely on imagination to visualise the consequences of nuclear power plant accidents since such accidents have occurred in the recent past. Two of the most serious ones were:

1. Chernobyl, Ukraine, 1986: Errors committed by human operators resulted in a devastating reactor explosion. Hundreds died due to immediate exposure to massive doses of radiation when the explosion occurred. The Ukrainian Ministry of Health estimated that fallout from the explosion has killed 125,000 of its citizens. An expert panel in a WHO conference in 1995 agreed that "the explosive increase in childhood thyroid cancer in Belarus, the Ukraine and the Russian Federation, the countries most contaminated by the 1986 Chernobyl accident, can be directly linked to nuclear radiation, and most likely to contamination by radioactive iodine isotopes". A recent report from Israel surmises that as many as 22,000 cancer patients in Israel are immigrants coming from areas near Chernobyl. Statistics suggest that radioactivity causes increase in people's susceptibility to common illnesses. Medical researchers are of the opinion that immune

systems are weakened by doses of radiation far lower than previously thought to be harmful. One collateral seems to be tuberculosis whose incidence has risen sharply in the contaminated areas.

A conference in Vienna in 1996 to assess Chernobyl's consequences, stated that the social and economic aspects are possibly far more significant than radiation exposure itself. Abnormally high rates of stress-induced illnesses such as heart disease, alcoholism and suicide were observed among the 135,000 citizens evacuated from the contamination zone; 600,000 people who worked to contain the accident and the 3.7 million people still living in the zones of significant radiation. The rate of spontaneous abortion increased by 25% in some of the contaminated areas. The level of induced abortion by mothers fearing malformations in unborn children were so high that the birth rate was 33% lower in central Europe in 1986-87. Besides the human casualties, wide-spread areas in Europe had high radioactive fallout damaging crops and dairy products. The economic cost of cleanup, evacuation and medical treatment from the accident is estimated to be more than \$100 billion so far. The cost of merely closing down the plant itself is estimated to be \$4 billion.

2. Three Mile Island, USA, 1979: Faulty indicator dials led human operators to remove coolant from the reactor resulting in the reactor being overheated. The uranium fuel rods inside that reactor melted, and the reactor was damaged beyond repair. Radioactive steam leaked to the surrounding environment. The plant had to be closed for good, and sealed off to prevent thousands of gallons of radioactive water from being released in the environment. The cost of clean up and other financial losses are estimated to be in the billions of dollars.

A significant fact that is emerging recently from studies in the US is that areas in proximity to a nuclear reactor (within 50 to 100 miles) show significantly higher rates of breast cancer mortality in women. It was observed that the breast cancer mortality rate in the localities where the seven oldest US Department of Energy nuclear reactors were situated rose by 37% during the period 1950-54 to 1985-89 period, whereas a corresponding rate for the entire US population rose by only 1%.

In addition to this, transparency and accountability is always a problem in projects involving nuclear materials. It is always easy to hide behind "national security" and "sensitive information" to withhold information from the public. This has been amply demonstrated in the case of nuclear facilities producing weapons in the US. Under pressure from 27,000 plaintiffs who lived downwind from the Hanford nuclear facility, the Bush administration admitted that in 1945 alone, enough radioactive iodine was released in the atmosphere from the plant to equal that released from the Chernobyl accident. People liv-

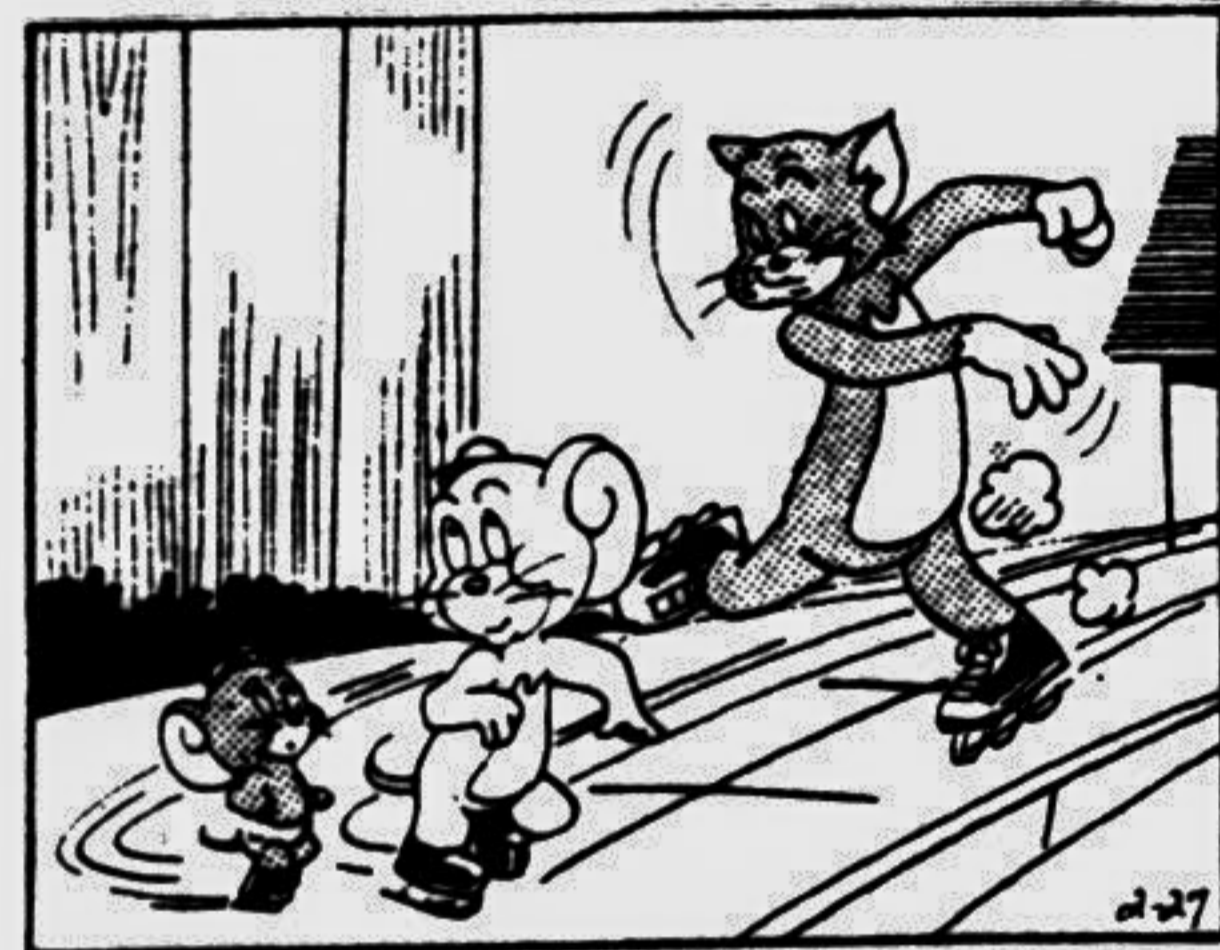
ing in the surrounding areas were not informed for 45 years. There are numerous examples of evasive actions and cover-ups by commercial nuclear plant authorities regarding the extent of malfunctions, accidents and consequent release of radioactive material. A news item published in *The Daily Star* on October 27, 1997 illustrates the point. The news states: "Immediately after the explosion in Magurichara, BAEC scientist were deployed at the site to detect any leakage of radioactivity but found none. The matter was never officially made public and all concerned remained tight lipped. We are told that all the 16 missing radioactive isotopes "miraculously" escaped leakage. We cannot, however, depend on such 'miracles' to happen too often."

In conclusion, it may be pointed out that most citizens of Bangladesh — children, women and men — live within a 200-mile radius of the proposed Rooppur nuclear power plant. The disastrous effects of such proximal living to a nuclear plant are amply demonstrated in the case of those people living near Chernobyl. Any accident in the Rooppur power plant has the potential to adversely impact the lives of every citizen of Bangladesh and of future generations. All this for producing 400-600 MW of electricity when there exists a high potential of discovering large gas fields in the near future. Thus the setting up of this power plant should not be at all considered without putting these issues in perspective and without serious public debate. It is imperative that, as a minimum, the following steps should be taken by BAEC and the government before any further pursuit of this project:

a) Organise public seminars where BAEC scientists and engineers will present their estimates of possible safety hazards and what steps will be taken to minimise them; and b) Have public hearings in communities near the plant regarding the probability of accidents occurring during the lifetime of the plant to determine the level of risk acceptable to the population and whether it is at all willing to take such risks. In this respect it is appropriate to quote Dr Yuri Scherbak, Ukrainian ambassador to the United States. In the April 1996 issue of the *Scientific American Journal*, he describes the significance of the Chernobyl accident: "It is a global environmental event of a new kind. It is characterised by the presence of environmental refugees; long-term irreparable damage to the ecosystems... (It) illustrates the great responsibility that falls on the shoulders of scientific and other experts who give advice to politicians on technical matters."

The author is an engineering consultant. He was involved in evaluating structural safety of several nuclear power plants.

Tom and Jerry



By Hanna-Barbera



IAN FLEMING'S James Bond



DRAWN BY JOHN MCLUSKY



Metropolitan

Environment and Forest Minister Syeda Sajeda Chowdhury inaugurating an international workshop on 'north south dialogue on climate change' at a city hotel yesterday.

Nat'l level environmental forum to be formed soon

A national level environmental monitoring forum will be formed soon with representatives from both the government and non-government organisations (NGOs) to monitor environmental activities in the country, reports BSS.

This was decided at a meeting of environmental NGOs organised by the Bureau of NGO Affairs in the conference room of the Department of Environment (DOE) yesterday.

Chaired by the Director General of NGO Affairs Bureau Giassuddin Pathan the meeting also decided that the DOE would prepare a draft on formation of the proposed forum with its terms of reference.

The meeting directed both the DOE and the Association of Development Agencies in Bangladesh (ADAB) to immediately identify areas of joint action by the government agencies and NGOs and take necessary measures to implement them.

The meeting felt the need for reform of the existing laws in the country to make them environment friendly and asked Bangladesh Environmental Lawyers' Association (BELA) to prepare a working paper on it. It also suggested strengthening of the information facilities in the DOE and ADAB for exchange of environmental information between the government agencies and the NGOs.

The meeting also decided to prepare a directory of government agencies and NGOs working in the field of environment.

Regional workshop on climate change held

Environment and Forest Minister Syeda Sajeda Chowdhury yesterday said appropriate and effective measures should be taken now to mitigate global climate changes and save Bangladesh from the severe threat of such changes in the coming century, reports BSS.

The minister was inaugurating a two-day Asian regional workshop on 'North-South dialogue on climate change' organised by a consortium of institutions led by BCAS, at a city hotel.



Death anniversary of Manabendra Larma today

By Staff Correspondent

The 14th death anniversary of Manabendra Narayan Larma, founder of the Farabitta Chattagram Jana Sanghati Samity and its military wing Shantibahini, will be observed by his supporters today.

Larma, a former member of parliament, was assassinated by a renegade faction of Shantibahini in 1983 at Kalayanpur camp in Tripura.

The PCJSS observes the day each year. In the three hill districts, the Pahari Chhatra Parishad (pro-Sanchoy), Pahari Gano Parishad and Hill Women's Federation will also observe the day, PCP sources said.

What's on today...

- Award ceremony:** Abdus Salam International Award for Journalism 1997 will be presented. Venue: Osmani Memorial Hall. Time: 4 pm. Chief guest: President Shahabuddin Ahmed.
- Training programme:** A training programme on fertiliser marketing management will begin. Organisers: Bangladesh Fertiliser Association, Fertiliser Association of India and FADINAP. Venue: Hotel Razmoni Ishakha. Kakkral. Time: 11 am. Chief guest: Food and Agriculture Minister Motia Chowdhury.
- Film show:** Zahir Raihan Film Society has arranged screening of Peter Brook's 'Mohabbarata' in three parts. Part I: 'The Game of Dice' will be shown today. Venue: Indian High Commission auditorium. Time: 6 pm.
- Meeting:** A joint meeting of the voluntarily retired journalists and employees of now defunct Dainik Bangla, The Bangladesh Times, Bichitra and Ananda Bichitra, will be held. Venue: Jatiya Press Club. Time: 11 am.
- Painting competition:** A children's painting competition on the theme 'child rights', will be held. Organiser: Children Foundation. Venue: Shishu Academy premises. Time: 3 pm.
- Rotary Club of Dilkusha:** The weekly meeting will be held. Venue: Purbani Hotel. Time: 5 pm.
- Rotary Club of Dhaka North:** The weekly meeting will be held. Venue: Sonargaon Hotel. Time: 6 pm.
- Rotary Club of Jahangirnagar Dhaka:** The weekly meeting will be held. Venue: Officers Club, Baily Road. Time: 6:30 pm.

US Embassy, USIS holiday Tuesday

The American Embassy, the United States Information Service (USIS), the USIS Information Resource Centre and the student counselling office will be closed on Tuesday, on the occasion of Veterans Day, a national holiday of the United States, says a USIS press release.

Obituary

Sayedra Afia Khatun, a social worker and mother-in-law of Kazi Mohammad Shafiqul Islam, vice-president, Federation of Bangladesh Chamber of Commerce and Industry (FBCCI), died of old-age ailments on November 5, says a press release.

Her kulkhwani will be held on Wednesday at her residence at 24, Rankin Street after Zohr prayers.

Razzak leaves for China

Water Resources Minister Abdur Razzak left capital yesterday for China on a 10-day official visit to discuss construction of the Ganga Barrage, report UNB.

He is leading a four-member delegation.

During the visit, Razzak will meet his Chinese counterpart, the Minister for Machinery Industry and the Governor of Hubei Province to exchange views with them about the construction of the Ganga Barrage in Bangladesh.

He will also exchange views with the Chinese leaders on the development of water resources and water management in Bangladesh.

Besides, Razzak will visit some Chinese water development projects and embankments.

Condolence meet on Ronesh Dasgupta held

By Staff Correspondent

A cross-section of people and various organisations paid their tribute to late communist leader, litterateur and journalist Ronesh Dasgupta in a condolence meeting held at the Central Shaheed Minar in the city yesterday.

Presided over by elderly writer Shawkat Osman, the meeting was organised by the National Committee for Remembering Ronesh Dasgupta.

Around 40 eminent personalities, including political leaders, cultural activists, litterateurs and educationists addressed the condolence meeting, highlighting late Dasgupta's political commitment and his contributions in the fields of culture and literature.

At the beginning of the meeting, one minute silence was observed in his memory.

Among others, Foreign Minister Abdus Samad Azad, Syed Hasan Imam, Hena Das, Sardar Fazlul Karim, Faysal Ahmad, Nirmal Sen, Ramendu Mozumder, Kamal Lohany, comrade Sunil Roy and Awami League presidium member Amir Hossain Anu spoke on the occasion.

Ila Mitra, an eminent leader of the Communist Party of India, also attended the programme.



US Ambassador to Bangladesh John C Holzman inaugurating an American Studies section at the Dhaka University Library yesterday. The section has been organised with about six thousand books donated by the United States Information Service (USIS). Vice Chancellor of Dhaka University Prof A K Azad Chowdhury, USIS Director John Kincannon and Deputy Director Robert Kerr were also present. — USIS photo

HERE and THERE

- DLAB**
A 135-member central committee and 215-member national council of the Democratic Lawyers Association of Bangladesh (DLAB) have been formed after a two-day conference of the organisation, a DLAB press release said yesterday, reports BSS.
- Barrister Shafiq Ahmed and advocate Mohammad Abdur Rashid have been elected president and general secretary respectively of the association.
- AUB**
Asian University of Bangladesh (AUB) has signed a memorandum of understanding with McGill Institute of Islamic Studies, Tehran University for exchange of students, faculty, publications and supervision of students in research leading to higher degrees, says a press release.
- McGill Institute** is a joint project of McGill University, Canada.
- BELA**
The certificate-giving ceremony of Bangladesh Environmental Lawyers Association's (BELA) training programme on "Environment and Environmental Law" was held recently at the BELA auditorium with "Environment and Right to Life" as the discussion topic, says a press release.
- Justice BB Roy Chowdhury was the chief guest at the function, chaired by Prof K. A. A. Quasemuddin, Chairman, BELA.
- Justice Chowdhury said there is a constitutional mandate on the state to ensure and safeguard proper environment and also an imperative duty of all citizens to take adequate measure to protect and improve both man-made and natural environment.